Research-Technology Management

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/urtm20

Measuring Innovation Effectively—Nine Critical Lessons

Companies looking to improve how they measure innovation can use nine critical lessons organized according to the themes of strategy, organization, and measurement design.

Jennie Björk, Johan Frishammar & Louise Sundström

To cite this article: Jennie Björk, Johan Frishammar & Louise Sundström (2023) Measuring Innovation Effectively—Nine Critical Lessons, Research-Technology Management, 66:2, 17-27, DOI: 10.1080/08956308.2022.2151232

To link to this article: https://doi.org/10.1080/08956308.2022.2151232

Measuring Innovation Effectively—Nine Critical Lessons

Companies looking to improve how they measure innovation can use nine critical lessons organized according to the themes of strategy, organization, and measurement design.

Jennie Björk, Johan Frishammar, and Louise Sundström

OVERVIEW: Few companies and organizations remain innovative for long periods of time, and despite high ambitions, many innovation initiatives fail to yield the desired results. Identifying how best to measure the effectiveness of innovation initiatives is key to ensuring that those efforts actually help an organization achieve its overall goals. This article offers organizations and their leaders practical advice for measuring innovation effectively. Specifically, it defines innovation measurement and its importance in precise terms and summarizes six years of our research on innovation measurement in multiple firms and industries. We articulate nine critical lessons for improving innovation measurement in real-world practice clustered into three overarching themes: Strategy, Organization, and Measurement Design. Each of the nine lessons elucidates a problem, identifies potential consequences, and proposes concrete solutions that organizations can implement as they strive to better measure and, ultimately, improve their innovation management initiatives.

KEYWORDS: Innovation, Measuring innovation, Innovation outcomes, Innovation auditing

Deficient innovation outcomes have multiple causes and many firm- and industry-specific idiosyncrasies may come into play. Nevertheless, a missing piece for many organizations is a systematic process for measuring innovation. Across industries, awareness is growing that it is insufficient to merely allocate funds to innovation and decide on ambitious strategies and goals. Companies also must track the results and outcomes of their investments (Richtnér et al. 2017). Prior research offers three explanations for why measuring innovation is central to achieving innovation in practice:

- *What gets measured gets done*—By measuring innovation, companies communicate their innovation strategy (Davila, Epstein, and Shelton 2012) and thereby channel the attention of employees and stimulate conversations about means and ends (Brattström et al. 2018).
- *Resources are precious*—Given that companies' resources are never unlimited, measurement makes it easier to pinpoint problems, follow up on deviations from original plans, and implement corrective measures in real time (Davila, Epstein, and Shelton 2012).

Jennie Björk is an associate professor of product innovation at the department of Engineering Design at KTH Royal Institute of Technology, Stockholm, Sweden. She has a PhD in technology management and economics from Chalmers University of Technology in Gothenburg, Sweden. Her main research interests are ideation, ideation management, measuring innovation, radical innovation knowledge sharing, knowledge creation, and social networks. A substantial part of her research is based on studies undertaken in close collaboration with companies. She has published her work in journals such as the *Journal of Product Innovation Management, MIT Sloan Management Review, Creativity and Innovation Management*, and *Technological Forecasting and Social Change*. Jennie.Bjork@md.kth.se

Johan Frishammar is a professor of entrepreneurship and innovation at Luleå University of Technology, Sweden, and an affiliated research fellow at the House of Innovation, Stockholm School of Economics, Sweden. He has a PhD in industrial management from Luleå University of Technology in Luleå, Sweden. He currently works on the topics of alliances, innovation measurement, business model innovation, sustainability transitions, and innovation in health care. Prior papers by him have appeared in journals such as *California Management Review, MIT Sloan Management Review, Journal of Product Innovation Management, Research Policy, Long Range Planning*, and others. Johan.Frishammar@ltu.se

Louise Sundström has a BSc in business and economics from Uppsala University and a diploma from Berghs School of Communication. She is currently a strategic project manager and senior analyst at Prime Weber Shandwick. She has extensive experience from applied consultancy work in marketing, strategy, sustainability and innovation, including innovation measurement. Louise.Sundstrom@unitedmindsglobal.com

DOI: 10.1080/08956308.2022.2151232

- *Measurement reveals opportunities*—When companies measure their activities, they more easily identify new business opportunities and set the stage for learning within the organization (Frishammar and Björk 2019).

It is clear that without measuring their innovation efforts, organizations are less likely to realize a return on their investments in innovation—and more likely to overlook opportunities and focus on variables that do not matter. The benefits of innovation measurement are becoming more and more well understood (Dobni, Klassen, and Wilson 2021; Richtnér et al. 2017). What is less clear is *how* to actually implement innovation measurement in everyday organizational practice. Concrete examples can provide critical insights on best practices in both developing and implementing innovation measurement, so that it is more likely to deliver the desired results.

We offer practical advice for measuring innovation and for actively managing the measurement process. Drawing on six years of empirical research on innovation measurement, across multiple firms and industries, we explain how measuring innovation differs from measuring other things that firms measure; we define innovation measurement in precise terms; and we articulate nine critical lessons that will help organizations better measure and improve their innovation management initiatives.

How Measuring Innovation Differs from Other Measurements

All innovations, by definition, differ qualitatively from whatever preceded them. This newness has three important implications for innovation measurement. First, innovation is more difficult to measure or benchmark within and across firms than, for example, quality- or production-related issues. Second, given the nature of innovation, measures often also must be qualitative, thereby increasing the difficulty of finding good proxies or measures. Third, the actual management of innovation measurement is typically more challenging and complex than with other types of measurement. While production is a matter for the production department and marketing for the marketing department, innovation is a task for the whole firm. It does not reside in a single unit but cuts across the whole organization, making it an inherently complex endeavor.

What We Know about Innovation Measurement

In the natural sciences, measurement entails use of a particular method to assess the size of a system. Innovation measurement works in the same way, albeit with less accuracy than in the natural sciences. For example, a company can use data from its own business system (method) to calculate the profits from its new service sales (size) in the total product and service portfolio (system).

Measuring innovation is critical for an organization to achieve its innovation goals and ambitions (Richtnér et al. 2017). Therefore, more and more companies have started to explore and experiment with a variety of ways to measure innovation. Historically, if innovation was measured at all, it was most common to focus on quantitative output measures such as the number of new products or services per year (Markham and Lee 2013). Nowadays, organizations are increasingly using qualitative measures of innovation, such as effects on organizational culture or on the company's openness to change and risk-taking.

Researchers have defined three different types of measures (Davila, Epstein, and Shelton 2012; Frishammar and Björk 2019). We present an abridged version:

- *Input measures* are forward-looking and help a firm to measure its potential for success in its innovation efforts. Examples include "number of innovative ideas generated per year" and "the extent of available resources for an innovation project in response to unforeseen events."
- *Current situation measures* help a firm to understand present conditions. These measures are critical for carrying out innovation activities because they help to manage events as they unfold in real time. Examples include "number or size of innovation projects in each phase of the innovation process" and "how much time has been spent so far in planning for an innovation project."
- *Results measures* are primarily retrospective. They elucidate, and often quantify, the yield of a firm's innovation efforts. Examples include "revenues from new product sales over total product sales" and "time from idea to launch of an innovation project."

Exhaustive lists of innovation metrics are beyond the scope of this article (Davila, Epstein, and Shelton [2012] and Richtnér et al. [2017] provide lists of metrics). Nonetheless, companies can choose from a large set of metrics as they measure their innovation portfolios, innovation processes, innovation projects, and innovation culture (Frishammar and Björk 2019). Studies that explore how to implement innovation measurement are scarce, however. Recent studies have extended the application and development of key performance indicators (KPIs) to help organizations manage different aspects of their new business effectively (Toma and Gons 2021; Lamprecht et al. 2022) and also use KPIs to focus on team measures (Sommer 2019).

In accounting, several studies focus specifically on measuring organizational performance (Bourne et al. 2000; Kaplan and Norton 1996). These studies offer important insights on measuring performance but say little about innovation measurement itself. In contrast, the innovation management literature includes a large body of empirical studies of innovation and its importance; however, few of the studies focus directly on innovation measurement (exceptions include Brattström et al. 2018; Davila, Epstein, and Shelton 2012; Frishammar et al. 2019). Recent research has also suggested normative frameworks for innovation measurement (Richtnér et al. 2017; Nappi and Kelly 2022), but concrete guidance and insights on how firms can better measure innovation are still lacking. In short, the focus

must shift from frameworks for measuring innovation to action-oriented advice on what organizations should do and consider in order to become better at measuring innovation.

Method

The results and guidance in this article are derived from more than six years of research into how firms measure innovation in practice. We studied mainly midsized and large incumbent manufacturing companies in the mining and metals, home appliances, forest and packaging, food processing, consumables, machine manufacturing, water and infrastructure, and automotive technology industries, plus a consultancy company. We provide key socio-economic characteristics of these companies (Table 1).

We conducted 39 semi-structured interviews, in addition to many interactions in formal and informal meetings. Most interviews took place in 2015–2016 and in 2018. The interviews and meetings were instrumental to understanding innovation measurement overall: its core activities, sequence of activities, pitfalls, outcomes, and contingency factors. We also collected data from an open-ended survey of 21 companies in 2015. The survey provided complementary input on reasons and motives for measuring innovation, measurement challenges, and on what should be measured. In addition, we held workshops with more than 150 managers from more than 60 different companies between 2015 and 2020. The workshops helped validate (or disconfirm) findings from the interviews and survey. Between 2019–2021, we engaged in applied action research at two companies, helping them to design and implement innovation measurement in practice. This practical experience, which allowed us to "test" the set of critical lessons in a real-life setting, included semi-structured interviews and workshops. We provide case descriptions and findings from the action research (Table 2).

We used thematic analysis to identify, analyze, and report patterns and themes in the data (Braun and Clarke 2006). While we departed from the innovation measurement literature as a theoretical basis for the empirical study, codes and themes emerged from the data analysis. We read carefully all the data collected to become familiar with its breadth, depth, and contents. We then generated initial codes; both second-order themes in the form of critical lessons and the first-order codes that underpin these (that is, various items or indicators of each second-order theme). The next phase involved searching for themes—that is, abstract categories under which two or more second-order themes could be subsumed. Finally, we reviewed, defined, and named the themes. We present the data structure categorized under three themes—Strategy, Organization, and Measurement Design—along with its second-order themes and some examples of first-order codes in the form of quotes or stories.

Nine Critical Lessons in Innovation Measurement

Nine critical lessons in innovation measurement emerged from our applied research projects. The lessons are intended to help companies use innovation measurement to improve their innovation outcomes.

Working closely with the two companies through applied action research allowed us to track how they developed their innovation measurement practices over time and glean insights about the real-world challenges and effects of measuring innovation. All nine critical lessons resonated with both companies, but some lessons were more pronounced

TABLE 1. Participating firms and key socioeconomic data

Firm	Industry	Primary Product/Service	Employees/ Revenues (USD) (approximate)
A	Mining and metals	Highly processed materials and mineral products	4,600 $2.9 billion
B	Home appliances	Kitchen and laundry product (and services)	54,000 $14 billion
C	Forest and packaging	Board and paper products	4,500 $2.7 billion
D	Food processing	Dairy products	560 $220 million
E	Consumables	Hygiene products	48,000 $13.3 billion
F	Consultancy	Services within design and innovation	61 $11 million
G	Machine manufacturing	Tools and tooling solutions	42,000 $11.5 billion
H	Water and infrastructure	Plumbing and infrastructure for home and society	4,100 $1.4 billion
I	Automotive technology	Complex system products and service solutions with a strong focus on advanced technologies	1,400 $1.5 billion

TABLE 2. Data structure

Themes	Critical Lessons	Exemplary Quotations (in normal font) / Stories from data (*in italics*)
Strategy	1: Start with strategy, not specific metrics.	"Measuring innovation is about doing it in a good way. Otherwise, you are lost. Breaking down one's financial and marketing goals into what achieves it." [Firm F, interview] "We must measure what is important in relation to the goal and set strategy. That is what we will be evaluated on. Innovation measurement as such is completely irrelevant if it does not focus on the goals and the strategy. It must be selected to what we want to achieve, then we need to start with our strategy and where we want to go." [Firm H, interview]
	2: Focus on ecosystem partners, not just your organization.	"In our industry it is extremely hard to just focus on measures of what we do in relation to measures of impact. We are so dependent on what other actors in the industry do." [Firm A, interview] "We need measurements that help us to understand the future better, metrics that help us understand in which direction we should go, also depending on the context we are in." [Firm H, interview]
Organization	3: Establish ownership early.	"Innovation measurement affects many different parts of our organization and also involves competences of these parts; therefore, how we measure and who to report to is very important for us to manage this." [Firm B, interview] *Today, most present measures and KPIs are tracked by production or quality functions; we need to decide on how innovation measures relate to already present measures and who will be responsible for these.* [Firm D, workshop]
	4: Secure cross-functional buy-in.	*Innovation measurement will affect many different functions of the organization; we must get all relevant departments on board.* [Firm D, interview] *Understanding, commitment, and engagement of innovation measurement in the organization is crucial for our success.* [Workshop with a group of innovation managers]
Measurement Design	5: Define the multiple purposes of innovation measurement.	"Innovation measurements for us also need to focus on learning, not only for following up and evaluating." [Firm B, Collaborative group work with strategy] *We need measurements for openness and understanding in the organization that incorporate experimenting and trying out new things.* [Firm D, workshop]
	6: Avoid availability bias when selecting measures.	"The difficulty with innovation measurement is that there are so many different possibilities, and it is so much easier to select to measure things that we already have numbers on or that are easy to calculate, instead of focusing on, for example, measuring soft values and actual impact." [Firm E, interview] *We have measurement processes for production and quality deviation. These do not work well for innovation. We have to refrain from just using what we already have and what is easy to use.* [Firm D, interview]
	7: Don't measure too many things.	*It is not hard to find measures. There are so many things that can be measured in relation to innovation. If we have too many, we will lose track of what we aim to do and it is also very costly to follow up on many measures.* [Innovation manager, workshop] "Measures have to be meaningful and not too many; we have so many measures and KPIs today that if we introduce too many new ones we will be buried in measures, and it will not make sense." [Innovation manager, workshop]
	8: Measure the whole, not merely specific parts.	"It is important that all parts of the company develop over time. Whether the advantage over competitors consists of a better product, better process, or better external relations is not the most important thing. It should therefore be important to measure innovation in all these areas." [Firm A, survey] "Normally, KPIs for R&D might be to measure launched products or projects based on number/time/cost, but that doesn't say anything about the value of what comes out. It's extremely difficult to measure ROI on new technical solutions. In the end, it is me who has to deliver and prioritize R&D projects, and I want to know that we are not only doing things right, but also that we are doing the right things. . . ." [Firm A, survey] "We measure what comes in and what comes out and what value it creates. We are better at measuring some things than others. We are good at looking at what is in the development process. Then we are a little worse, significantly less good in fact, at measuring impact; the actual effect afterwards." [Firm E, interview]
	9: Clarify relationships among selected measures.	"We must make sure that our measures work together, both measures for innovation and other things we measure. Today we have established KPIs in the organization that focus on each division's performance, but we want to have innovation measures that encompass openness, knowledge sharing, collaboration, and learning across departments. This will be a problem." [Innovation manager, workshop] "All of these pieces are so extremely contextual and interrelated, and so we all know it's not an easy fix, push a button and you're done." [Firm A, survey]

in each case (see "Case 1: A Global Home Appliance Company's Push for More Radical Innovation" on page 21 and "Case 2: A Food Processing Company's Effort to Enhance Innovation and Design a Measurement System" on page 21).

Lesson 1: Start with Strategy, Not Specific Metrics

Companies that recognize that they should measure their innovation efforts often ask which metrics are best to use. Based on our research, we have determined that innovation measurement is a means to an end, not an end in itself. We recommend companies first clarify their innovation strategy and ensure that it identifies not only the innovative products and services but also how they will create value for customers and the firm (Pisano 2015). When the innovation strategy is unclear, efforts to measure innovation can become detached from a company's innovation objectives, focus too narrowly, and not yield the desired outcomes. In short, a company's chosen metrics should fulfill the purpose of its strategy; no metric on its own is inherently strategic. An explicit innovation strategy is preferable, but a business unit strategy also can work.

An innovation strategy should be concrete and clear, but several firms we studied failed in this regard. For example, a global home appliances company (Firm B) had articulated an overall goal of where it wanted to be in 10 years, but it had not created an explicit innovation strategy for achieving that goal. During our work with Firm B, some of its managers started to doubt whether spending resources on particular projects could ever move the firm toward its 10-year goal without an innovation-strategy roadmap. An employee responsible for design development said, "Innovation is all about value … .we

Case 1: A Global Home Appliance Company's Push for More Radical Innovation

Case 1 was a global manufacturing company (Firm B), where we worked with the home appliances division. The company's core innovation entailed creating new products and services. Despite its ambitious plans, innovation outcomes often fell short, and managers advised us that customers perceived innovation as too incremental. The core of our work with Firm B was therefore to push for more radical innovation and to disentangle the role of innovation measurement in that process.

The key problems identified included a heavy focus on short-term results, which created a risk-averse culture; an overly rigid product development process, which was unfit to more radical innovation; policy documents (in the form of an "Innovation handbook") that discouraged radical innovation; and overall, a portfolio management/resource allocation system that favored incremental development.

Our work with the home appliances firm centered on broadening the purpose of measurement (Lesson 5), from pure follow-up to learning and identifying new opportunities, which is particularly critical in radical innovation. Our analysis revealed a need to clarify the innovation strategy (Lesson 1), which the company then pursued in a separate project. Securing cross-functional buy-in (Lesson 4) proved critical as competencies from both marketing, new product development, design, and other departments were deemed necessary and because subsequent measurement impacted all these areas. Measuring the whole and not only specific parts (Lesson 8) was at the forefront because the company needed to sustain its current focus on incremental innovation, too, thus trying to become more ambidextrous.

The project resulted in a set of firm-specific measures geared toward radical innovation and routines regarding ownership and follow-up. It also highlights the systemic nature of innovation measurement, and that measurement can trigger the need to revise other innovation activities (such as clarifying the innovation strategy and/or revising the formal new product development process).

Case 2: A Food Processing Company's Effort to Enhance Innovation and Design a Measurement System

Case 2 was a food processing company (Firm D) focusing mainly on dairy products for domestic and international markets. The company needed continuous product innovation, service innovation together with partners (like influencers or retailers), and process innovation to improve internal efficiency. Firm D wanted to improve its innovation capabilities overall and complement its current measurement system, which centered on quality and production-related measures, with measures on innovation.

Problems included a narrowly defined innovation strategy; a strong focus on incremental innovation (in the form of line extensions); an overall low maturity of innovation activities; and a production-dominated environment, which pushed R&D toward incremental improvements.

We helped the company create a new innovation strategy (Lesson 1). We broadened the conceptual foundation of "value" to focus on the company itself, its customers, and broader society, and its subsequent implications for innovation measurement. Defining ownership of measures (Lesson 3) was critical as the company tracked most current measures and KPIs either by production or quality functions, which lacked experience with R&D and innovation. Cross-functional buy-in (Lesson 4) was critical as measurement affected not only production and quality departments but also R&D and marketing and the interfaces among these. Avoiding the availability bias (Lesson 6) was at the forefront because the firm had mature measurement processes regarding production and quality deviations in place, which proved a poor substitute for innovation.

The project resulted in a new and updated innovation strategy and a new set of innovation metrics to measure the outcome of the strategy. This case underscores the need for having a clear innovation strategy, the importance of securing cross-functional buy-in, and the role of creating alignment among functions and departments to measure innovation successfully.

A company's chosen metrics should fulfill the purpose of its strategy; no metric on its own is inherently strategic.

need to know what kind of product *offers* we're aiming for in 10 years. Then we can identify which products we need to work on in order to meet that goal." When companies know explicitly where they want to be, the metrics they choose help them get there.

Lesson 2: Focus on Ecosystem Partners, Not Just Your Organization

Increased globalization, digitalization, and a greater focus on environmental and climate issues are affecting organizations worldwide. These issues have clear implications regarding what innovations to measure and how and where to measure them. When innovating, few companies do everything themselves—rather, they collaborate in ecosystems where multiple firms create a joint value proposition (Adner 2017). The implications for innovation measurement are straightforward. A focal firm should also measure its partners, such as customers, suppliers, and other ecosystem actors—or at least become aware of how important its ecosystem partners are to its measurement practices. Innovating within an ecosystem depends on relations, not just transactions.

For example, in advanced service solutions, various actors work together such that the innovation process, by definition, must be more open and collaborative. Innovation measures, then, should extend beyond the company to include ecosystem actors—such as customers, sub-suppliers, service providers, or digital actors (like platform companies)—and, potentially, those entities' processes and systems. As the innovation landscape for many organizations increasingly incorporates more open and more distributed innovation processes, innovation measurement, too, must change to focus not only on a focal firm, but on the focal firm and its key ecosystem partners.

Lesson 3: Establish Ownership Early

The responsibility for innovation typically spans departments (Barczak and Kahn 2012); we found that ownership over measurement activities and metrics is often left unspecified. Because deciding who owns measurement tasks may be difficult, complex, and politically sensitive, companies may wait too long in the innovation process to decide on ownership, which can thereby jeopardize alignment with the broader innovation strategy. In worst cases, nobody ever takes clear responsibility, and the innovation effort is entirely stymied.

Deciding who should be responsible for innovation measurement depends on how a particular firm is organized. Effective innovation measurement requires clear, early directives from the CEO (at smaller firms) or SBU level managers (at larger firms) about who is responsible for what—with ownership sometimes being dispersed, for example, among R&D, marketing, sales, and business development functions. Ideally, the company gives directives when the innovation strategy is set. The directives then evolve over time, as the firm makes changes regarding which metrics to use and how the measurements are assessed and by whom.

A firm in the mining-and-metals industry (Firm A) we studied had a portfolio of measures for tracking innovation in manufacturing processes and process technology. It did not, however, precisely specify who had ultimate responsibility to act on these measures: was it factory managers, central R&D, process engineering, or other departments? This ambiguity hampered the effectiveness of the innovation. In contrast, a large company supplying packaging solutions took a more mature approach: it used an explicit "performance management system" (the company's term), including KPIs, and predefined the ownership roles so that measurement results were fed back to designated decision-makers. The explicit ownership roles allowed the firm to have more effective follow-up of new product development and new product sales.

Lesson 4: Secure Cross-functional Buy-in

Formally deciding who owns which metrics and measurement tasks by no means guarantees that the decision will be understood, accepted, and executed properly by managers and engineers at the key departments or functions involved in innovation. Given that innovation is more complex and "systemic" than many of a firm's other activities (Damanpour and Gopalakrishnan 2001), and affects multiple functions that must work together, buy-in across functions can be difficult to achieve. The implications of deficient buy-in among all stakeholders are severe: 1) the implementation process stalls, 2) political battles over who "owns" certain metrics or results can ensue, and 3) the purpose of a specific measurement may be interpreted differently across the organization and therefore yield competing or contradictory effects.

Consider a consultancy company that measures consulting time. Employees may interpret "time" as a measurement of profitability on each project (income per hour) or as the efficiency of individual consultants or groups of consultants. If the intended purpose is to measure profitability, it is crucial to clarify that—and how measurements will be made—so that employees do not, for example, start reporting too little consulting time just to seem more efficient.

Communication and consensus must be consistent across individual units and departments. One successful solution we observed was to apply cross-functional integration practices—in particular, the exchange of "rich" information—to help stakeholders understand one another's perspectives and collectively agree on which tasks and responsibilities are assigned to whom. For example, one food processing company (Firm D) used a series of cross-functional workshops to solicit input on innovation strategy and discuss a set of

appropriate KPIs. The face-to-face meetings made it easier to negotiate solutions, exchange ideas, understand alternative points of view, and eventually converge on decisions that stakeholders perceived as legitimate.

Lesson 5: Define the Multiple Purposes of Innovation Measurement

Many organizations misconstrue the purpose of innovation measurement by, for example, using it only to conduct follow-up and evaluation of innovation efforts or, worse, to blame people, functions, or departments for failing to meet innovation targets. Innovation measurement should have three explicit purposes: 1) to plan and focus, 2) to follow up and evaluate, and 3) to learn from experience and identify new opportunities. Defining the purpose too narrowly limits the organization's potential to derive overall organizational value from its innovations and even to generate benefits at the project level.

The head of digital transformation at a firm in the mining and metals industry (Firm A) said that measuring innovation not only helped the company follow up on its innovation efforts, it also provided space for employees to reflect on and analyze what had been done, what they learned, and what to apply to future innovation initiatives. This self-reflection is especially important when innovation activities are transformative, given the high level of risk and uncertainty. Also, when learning is an explicit purpose of measuring innovation, firms are more likely to avoid future mistakes. An innovation measurement system is not a substitute for personal or professional judgment, however. But if properly designed, such a system can help an organization make better decisions about its innovation initiatives.

Lesson 6: Avoid Availability Bias When Selecting Measures

Availability bias can materialize in two main ways: 1) firms might opt for metrics that are already in use for other initiatives, merely out of convenience, and 2) there may be a tendency to select measures that are easily accessible rather than truly useful. The result is that the innovation measurement effectiveness suffers.

We observed that many firms make biased or at least overly narrow selections of metrics because the full array of metrics is simply not available—not just that some are easier to access and deploy or that some types of metrics are inherently better than others. For example, a company may default to quantitative measures simply because they perceive them to be more objective and reliable. Numerical data can be incorrect, and for some important desired outcomes, quantitative data are simply impossible to obtain.

When firms select the wrong (or at least a less valuable set of) measures, those choices may not always cause harm even though they will not help to achieve the desired strategic goals. Availability bias often leads an organization to use only measures such as number of new products/services per year, or a corresponding quota in relation to total number of products/services. These measures do enumerate the innovation activities and can be very valuable for comparing companies, but they alone provide little room for the organization to respond dynamically during the innovation process.

The director of innovation management at a firm that specializes in water and infrastructure systems (Firm H) compared using such narrowly defined measures to trying to lose weight only after stepping on a scale to measure the past year's progress, rather than defining in advance which physical activities to engage in during the year in order to achieve a year-end weight-loss goal. This firm's innovation strategy included an explicit focus on transformative innovations that, it realized, required assessment and calibration of risk-taking in the organization. It eventually assessed risk-taking using a yearly employee survey.

Before selecting measures, identify which metrics and measured outcomes are appropriate for particular purposes. As an interviewee from Firm E put it, "Before I start with the innovation measurement practices, I need to know what I can choose from."

Lesson 7: Don't Measure Too Many Things

When firms start measuring innovation, they may be inclined to focus on an excessive number of metrics. Such over measuring is expensive because it strains both resources and attention. Some of the companies we studied were far too detailed and ambitious in their innovation measurement activities. They tried to measure everything—in some cases, more than 100 key metrics. The underlying assumption was that more measurement meant better outcomes. An excessively detailed measurement system risks yielding multiple negative effects: increased administration, misinterpretation, difficulty in channeling employees' attention, and data and information overload across the firm. It is therefore better to stick with a limited number of measures—typically, 15 to 20 (Davila, Epstein, and Shelton 2012)—that can be easily managed and that all employees know about and understand. In practice, this commonly means five to seven metrics of the innovation process, with the rest focusing on the specific firm's goals at the levels of the overall portfolio, project, and culture.

A consultancy company we engaged with in workshops had a frugal yet effective approach to measurement. It started to measure the number of radically new customer projects

Innovation measurement should have three explicit purposes: 1) to plan and focus, 2) to follow up and evaluate, and 3) to learn from experience and identify new opportunities.

per year and the revenues from radically new services relative to total service sales, thereby facilitating a bolder innovation strategy. Specifically, employees started to focus more on radical innovation projects that involved collaboration with customers. Customers in this case were large original equipment manufacturer companies, and the collaborative projects often centered around making products and parts "smart" by developing new digital products and technology (both hardware and software).

In contrast, we came in contact with multiple firms in the process industry—for example, mineral-and-metals and pulp-and-paper companies—that focus heavily on process innovation in production processes and underlying manufacturing technologies; they often had more than 100 metrics related to production, quality, maintenance, and so on. Such a sprawling portfolio of measures is neither frugal nor a pure or good proxy for innovation. The excessive breadth of the metrics diluted employees' attention and time, and thereby undercut productivity and the very purpose of the measurement endeavor.

Lesson 8: Measure the Whole, Not Merely Specific Parts

Some organizations are quite good at measuring specific parts or areas of innovation activity, but we frequently observed deficiencies in holistic or broad-based innovation measurement. A common pitfall is to focus on individual innovation projects while giving short shrift to the overall portfolio. Some companies measure input to the innovation process, such as the number of new ideas, but not output, such as how successful new products actually are. Other companies measure only output or focus heavily on the new product development processes at the expense of projects, portfolio, and innovation culture.

Such narrow approaches, varied as they are across organizations, overlook the big picture by not focusing comprehensively on the process, portfolio, project, and cultural levels with an appropriate mix of input, current situation, and result measures. The risk is that you get blinded by the outcome (whether positive or negative) of one specific project or process and miss out on the long-term strength that innovation measurement offers. For example, the global home appliances firm (Firm B) we worked with measured work climate through an annual employee survey and complemented it with KPIs for product and service innovation. Firm B was, however, much less systematic about its innovation portfolio management and individual innovation projects. For example, the firm wanted to engage in more radical innovation but lacked portfolio measures and targets that would facilitate resource allocation in that direction. As a result, Firm B had not realized its full potential in innovation measurement and management.

Lesson 9: Clarify Relationships among Selected Measures

It is essential to make explicit the interdependencies and potentially conflicting goals among metrics in the portfolio of innovation measures. When companies fail to appreciate such interdependencies, confusion can ensue, thereby undermining innovation strategy—as in the previously discussed example of how people at a consulting firm interpreted "time." The result can be to diminish collaboration among departments as they pull in different directions.

We often observed firms, for example, embark on a service-oriented innovation strategy while their metrics still focused on sales of physical products. Sometimes, the metrics encouraged product sales and service sales in ways that were incompatible. For instance, we observed several manufacturing firms that undertook physical product development in one country but did service development in other countries, in order to calibrate the offers to varying international requirements. In these cases, the companies evaluated domestic R&D departments according to KPIs that focused largely on standardized physical products, whereas the global sales organizations pushed for customization of another set of KPIs relevant to services. Not surprisingly, the two types of KPIs pointed in different directions, which resulted in misaligned relationships between the measures and hampered the effectiveness of total product/service offers.

The solution is simple: go back to the overall innovation strategy, and make sure that all metrics in the portfolio align with it, such that the selected metrics channel attention and efforts in the same direction.

We summarize the nine critical lessons and their corresponding problems, consequences, and solutions to give innovation practitioners a reference and guiding tool (Table 3).

Conclusion

The nine critical lessons for innovation measurement are intended to spur companies to develop and deploy innovation measurement suited to their particular organizational needs, opportunities, and constraints. Companies must first understand that innovation strategy is the pillar on which innovation measurement stands. They must recognize that innovation efforts seldom fit neatly into current organizational structures. With that understanding, firms can then begin to implement the nuts-and-bolts of effective innovation measurement. A firm's internal roles and functions must receive explicit directives from top management about how to measure innovation activities so that they can achieve and measure explicitly stated innovation goals. Innovation measurement demands that organizations continuously think and act in new ways that evolve over time, adapt to unexpected realities, and avoid the common pitfalls that so often stymie innovation.

The authors would like to thank RTM's editorial team and reviewers for comments on previous drafts. The research was funded by the Swedish governmental agency VINNOVA.

TABLE 3. Nine critical lessons for innovation measurement

Lesson	Problem	Consequences	Solution
1. Start with strategy, not specific metrics.	Seizing on specific metrics right out of the gate, while losing sight of the big-picture strategy.	• Blind movement in the wrong strategic direction • Loss of ground in achieving strategy goals	• Choose metrics that fulfill the strategic purpose; no metric on its own is inherently strategic. • Articulate explicitly a concrete innovation strategy, in service of a larger business-unit strategy.
2. Focus on ecosystem partners, not just your organization.	Confronting the complexity of external players—customers, suppliers, and other ecosystem actors—that matter in measuring innovation.	• Reliance on internal metrics that overlook or misrepresent the roles and value of ecosystem partners • Lack of insight about where the organization's innovation efforts fit in the ecosystem	• Assess ecosystem partners' innovation activities. • Identify which of those activities complement your organization's innovation initiatives and measurement efforts. • Raise awareness of how ecosystem partners relate to the organization's innovation strategy and measures.
3. Establish ownership early.	Failing to define who is responsible for various parts of the innovation measurement process.	• Poorly defined roles • Tasks with no clear owner • Weak alignment with the broader innovation strategy • Impediments to acting on captured measures	• Decide on a role or function that is responsible for the innovation measurement practice. • Have top management give clear directives to the responsible persons or entities. • Provide sufficient resources for compiling and analyzing pertinent data.
4. Secure cross-functional buy-in.	Getting all functions that have a stake in innovation measurement to be on the same page.	• Stalled implementation processes • Political battles over metrics and results • Inconsistent interpretation across units, with competing or contradictory effects	• Make communication and consensus consistent across departments. • Apply cross-functional integration practices, such as the exchange of "rich" information, to help stakeholders collaborate effectively.
5. Define the multiple purposes of innovation measurement.	Framing the purposes of measurement too narrowly, often merely as follow-up and evaluation.	• Missed opportunities for organizational learning • Limited potential to derive overall value from innovations and from benefits at the project level	• Define three explicit purposes of measurement: to plan and focus, to follow up and evaluate, and to learn from experience and identify new opportunities. • To fulfill these aims, deploy relevant resources early in the innovation management process.
6. Avoid availability bias when selecting measures.	Finding it easier to rely on metrics that are readily available than on those you actually need to measure.	• Selection of measurements that offer poor guidance toward achieving innovation goals • Distortion or undermining of the larger innovation strategy	• Ask at the outset where the organization wants to go and what it must learn to assess whether it is on the right track. • Do not automatically default to data and trackers that are already in place.
7. Don't measure too many things.	Burying the few meaningful measures in a sea of metrics.	• Lack of focus • Wasted resources and attention on tasks that lack sufficient value • Confusion among employees	• Select a limited number of measurements that make sense, point in the same direction, and are understood by everyone. • Arrange the measurements in an efficient hierarchy.
8. Measure the whole, not merely specific parts.	Losing the holistic overview of innovation ("the forest") to an array of subset innovations ("the trees").	• Undue weight given to specific projects or processes, at the expense of the whole • Blindness to the long-term value of innovation measurement	• Focus comprehensively on the process, portfolio, project, and cultural levels of innovation measurement. • Include an appropriate mix of input, current situation, and results measures.
9. Clarify relationships among selected measures.	Facing the challenge that metrics in the innovation measurement portfolio have inherent interdependencies and potentially overlapping goals.	• Confusion stemming from a failure to make interdependencies among measures explicit • Pursuit of conflicting goals • Unproductive internal competition	• Map out and communicate clearly to everyone involved what purpose each measurement has in the whole system. • Clarify each person's and function's role in fulfilling the overall innovation and business strategies.

References

Adner, R. 2017. Ecosystem as structure: An actionable construct for strategy. *Journal of Management* 43(1): 39–58. doi: 10.1177/0149206316678451

Barczak, G., and Kahn, K. B. 2012. Identifying new product development best practice. *Business Horizons* 55(3): 293–305. doi:10.1016/j.bushor.2012.01.006

Bourne, M., Mills, J., Wilcox, M., Neely, A., and Platts, K. 2000. Designing, implementing and updating performance measurement systems. *International Journal of Operations & Production Management* 20(7): 754–771. doi: 10.1108/01443570010330739

Brattström, A., Frishammar, J., Richtnér, A., and Pflueger, D. 2018. Can innovation be measured? A framework of how measurement of innovation engages attention in firms. *Journal of Engineering and Technology Management* 48:64–75. doi: 10.1016/j.jengtecman.2018.04.003

Braun, V., and Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3(2): 77–101. doi:10.1191/1478088706qp063oa

Damanpour, F., and Gopalakrishnan, S. 2001. The dynamics of the adoption of product and process innovations in organizations. *Journal of Management Studies* 38(1): 45–65. doi: 10.1111/1467-6486.00227

Davila, T., Epstein, M., and Shelton, R. 2012. *Making Innovation Work: How to Manage It, Measure It, and Profit from It*. Upper Saddle River, NJ: FT Press.

Dobni, C. B., Klassen, M., and Wilson, G. A. 2021. Five strategy shifts for innovation. *Strategy & Leadership* 49(2): 36–40. doi: 10.1108/SL-11-2020-0136

Frishammar, J., and Björk, J. 2019. *Innovationsstark—Planera, utvärdera och lär nytt med innovationsmätning*. Laholm: Trydells Tryckeri. https://www.innovationsstark.se

Frishammar, J., Richtnér, A., Brattström, A., Magnusson, M., and Björk, J. 2019. Opportunities and challenges in the new innovation landscape: Implications for innovation auditing and innovation management. *European Management Journal* 37(2): 151–164. doi: 10.1016/j.emj.2018.05.002

Kaplan, R. S., and Norton, D. P. 1996. Linking the balanced scorecard to strategy. *California Management Review* 39(1): 53–79. doi: 10.2307/41165876

Lamprecht, C., Gebauer, H., Fleisch, E., and Wortmann, F. 2022. A KPI set for steering the IoT business in product companies: Product companies can use the key performance indicators set presented here to manage their Internet of Things business effectively and avoid three pivotal measurement traps. *Research-Technology Management* 65(2): 53–63. doi: 10.1080/08956308.2022.2015951

Markham, S. K., and Lee, H. 2013. Product Development and Management Association's 2012 Comparative Performance Assessment Study. *Journal of Product Innovation Management* 30(3): 408–429. doi: 10.1111/jpim.12025

Nappi, V., and Kelly, K. 2022. Proposing a performance framework for innovation measurement: An exploratory case-based research. *International Journal of Productivity and Performance Management* 71(5): 1829–1853. doi: 10.1108/IJPPM-06-2020-0332

Pisano, G. P. 2015. You need an innovation strategy. *Harvard Business Review* 93(6): 44–54.

Richtnér, A., Brattström, A., Frishammar, J., Björk, J., and Magnusson, M. 2017. Creating better innovation measurement practices. *MIT Sloan Management Review* 59(1): 45–53.

Sommer, A. F. 2019. Agile transformation at LEGO Group: Implementing agile methods in multiple departments changed not only processes but also employees' behavior and mindset. *Research-Technology Management* 62(5): 20–29. doi: 10.1080/08956308.2019.1638486

Toma, D., and Gons, E. 2021. *Innovation Accounting. A Practical Guide for Measuring Your Innovation Ecosystem's Performance*. North Holland: BIS Publishers.

INNOVATION 2023

IRI ANNUAL CONFERENCE

May 22-25, 2023
Philadelphia, PA

LEARN MORE AT WWW.IRIWEB.ORG